

CHANGE ISSUE – RTCA/DO-242

MASPS for ADS-B Rev. A

Tracking Information (committee secretary only)	
Change Issue Number	59
Submission Date	2/12/02
Status (open/closed/deferred)	Rev A. – CLOSED
Last Action Date	2/22/02

Short Title for Change Issue:	Symbol for Nautical Mile
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MASPS Document Reference:		Originator Information:	
Entire document (y/n)	Yes	Name	James Maynard
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Paragraph number(s)		E-mail	James.maynard@at.ups.com
Table/Figure number(s)		Other	

Proposed Rationale for Consideration (originator should check all that apply):	
<input checked="" type="checkbox"/>	Item needed to support of near-term MASPS/MOPS development
<input checked="" type="checkbox"/>	DO-260/ED-102 1090 MHz Link MOPS Rev A
<input checked="" type="checkbox"/>	ASA MASPS
<input checked="" type="checkbox"/>	TIS-B MASPS
<input checked="" type="checkbox"/>	UAT MOPS
<input type="checkbox"/>	Item needed to support applications that have well defined concept of operation
<input type="checkbox"/>	Has complete application description
<input type="checkbox"/>	Has initial validation via operational test/evaluation
<input type="checkbox"/>	Has supporting analysis, if candidate stressing application
<input checked="" type="checkbox"/>	Item needed for harmonization with international requirements
<input type="checkbox"/>	Item identified during recent ADS-B development activities and operational evaluations
<input type="checkbox"/>	MASPS clarifications and correction item
<input type="checkbox"/>	Validation/modification of questioned MASPS requirement item
<input type="checkbox"/>	Military use provision item
<input type="checkbox"/>	New requirement item (must be associated with traffic surveillance to support ASAS)

Nature of Issue:	<input type="checkbox"/>	Editorial	<input checked="" type="checkbox"/>	Clarity	<input type="checkbox"/>	Performance	<input type="checkbox"/>	Functional
<p><u>Issue Description:</u></p> <p>There is no internationally agreed symbol for the nautical mile. In the absence of such a universally agreed symbol, each organization has to define what symbol it will use in the style guide for documents published by that organization. Possible symbols are:</p> <p style="margin-left: 40px;"> NM Used by ICAO and by RTCA in DO-236A nmi Used by IEEE and GPO in their style guides nm Used in at least one dictionary </p> <p>Further discussion is found in Attachment A of this Issue Paper.</p>								

<p><u>Originator's proposed resolution:</u></p> <p>I recommend that we use NM as the symbol for nautical mile. This will reduce the amount of editing needed to convert our documents to ICAO SARPS.</p>

Ad Hoc Group Deliberations:

February 22, 2002: This Issue Paper was reviewed by WG6 at their February 2002 meeting. It was agreed that this Issue Paper will be addressed in Revision A.

Working Group 6 Final Resolution:

The abbreviation “NM” will be used consistently throughout DO-242A.

(This abbreviation will also be used in the 1090 MHZ ES and UAT ADS-B MOPS.)

1. The ultimate authority for matters of weights and measures and the symbols to represent them is the International Bureau of Weights and Measures (BIPM, Bureau International des Poids et Mesures) and its International System of Units (SI). We should, so far as possible, follow the practice established by the BIPM and not conflict with symbols defined in the SI. That rules out using “nm” for nautical mile, because “nm” is the SI symbol for “nanometre.”

References:

The International System of Units (SI), brochure published by the BIPM, Paris, 1998. Available on the internet in English at <http://www.bipm.fr/pdf/si-brochure.pdf> and in French at <http://www.bipm.fr/pdf/brochure-si.pdf>.

2. From the page numbered 106 in the English-language version of the SI brochure:

Table 8 lists some other non-SI units which are currently accepted for use with the SI to satisfy the needs of commercial, legal and specialized scientific interests. These units should be defined in relation to the SI in every document in which they are used. Their use is not encouraged.

Table 8. Other non-SI units currently accepted for use with the International System

Name	Symbol	Value in SI units
nautical mile ^(a)		1 nautical mile = 1852 m
knot		1 nautical mile per hour = (1852/3600) m/s
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.	.	.
,	.	.

- (a) The nautical mile is a special unit employed for marine and aerial navigation to express distance. The conventional value given above was adopted by the First International Extraordinary Hydrographic Conference, Monaco, 1929, under the name “International nautical mile”. As yet there is no internationally agreed symbol. This unit was originally chosen because one nautical mile on the surface of the Earth subtends approximately one minute of angle at the centre.

Note that “there is as yet no internationally agreed symbol” for the nautical mile and also that “these units should be defined in relation to the SI in every document which they are used.” Let’s do that in Appendix B, Definition of Terms.

3. The following table lists various symbols for the nautical mile and some organizations that use those symbols. The list is not exhaustive, but is extracted from a series of e-mail messages on the subject, and (in one case) a trip to the local library.

Symbol	Organization	References
(no symbol specified)	BIPM	Brochure on the use of the International System of Units (SI): http://www.bipm.fr/pdf/si-brochure.pdf
	U.S. NIST	<i>Guide for the Use of the International System of Units</i> : http://physics.nist.gov/Document/sp811.pdf
		<i>How Many? A Dictionary of Units of Measurement</i> , © Russ Rowlett and the University of North Carolina at Chapel Hill: http://www.unc.edu/~rowlett/units/dictN.html#nautical_mile
NM	ICAO	ICAO SARPS: Draft SARPS for ADS-B (SICASP/7-WP/55) E-mail from Vincent Orlando to members of WG-3
	RTCA	DO-236A
		<i>Chicago Manual of Style</i> (14 th edition, 1993), §14.50, p. 483: “NM or naut mi, nautical mile (1,852 m)”
nmi	IEEE	<i>Information for Authors for IEEE Transactions, Journals and Letters</i> : http://www.ieee.org/organizations/pubs/transactions/auinfo00.pdf .
	U.S. GPO	U.S. Government Printing Office style manual: http://www.access.gpo.gov/styleman/2000/pdf/chap09.pdf paragraph 9.62.
	U.S. NITS	Appendix A to FS-1037C: http://www.its.bldrdoc.gov/fs-1037/dir-001/_0001.htm
nm	?	(No references found so far that use “nm” for “nautical mile.”)

The really persuasive argument for me (Jim Maynard) comes from an e-mail from Vincent Orlando, the chair of WG-3: “I just checked my SCRSP (and SICASP) documents and “NM” is the ICAO abbreviation for nautical mile. Since part of DO-260 has already been converted to ICAO SARPs and more will be converted in the future, I think that it is very important that we adopt the same abbreviation. If any one from New Mexico complains, we can direct them to ICAO headquarters.”